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Optimizing the WPI Assistive Technology Resource Center: Operation and Management

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Abstract

The Assistive Technology Resource Center (ATRC) at the Worcester Polytechnic Institute (WPI) originated with the intent to fill the need for a regional, specialized assistive technology hub, which would be a source for the technical information required in order to create customized assistive technology devices.

As time has progressed, the Center has expanded and has aided many individuals with disabilities. This was done by creating new solutions to disability-related issues that were not addressed in the past, primarily by designing new devices or modifying existing ones. After ten years of operation, it became necessary to re-evaluate the operation of the Center and to remedy some of the potential weaknesses that may have kept it from operating at its full potential.

This project concentrates on identifying these issues and physically creating a solution for them. Doing so is necessary in order for the Center's operation and management to be optimized, which in turn would ensure that the ATRC will remain successful in the years to come.

Acknowledgements

The team would like to thank several individuals for the help and guidance they offered throughout the project. This aid proved to be critical for the team's success, since their knowledge in certain, specific areas was necessary to keep the team going forward and staying on the right track.

First and foremost, the group extends their regards to Professor Allen Hoffman who advised the project, provided the majority of the necessary information, and critiqued the team's work in order to ensure its quality. The group also thanks Allan Katz for helping with the clean-up and reorganization of the Rehabilitation Engineering Laboratory. Last but not least, the team extends their regards to Siamak Najafi for working with the group on properly updating the ATRC website and providing some much needed technical support.

Table of Contents

Abstract i
Acknowledgements ii
Table of Contents iii
List of Figures iv
List of Tables iv
Chapter 1: Introduction 1
Chapter 2: Background 3
2.1 ATRC Background 3
2.1.1 Establishment 3
2.1.2 Progression and Results 5
2.1.3 Rehabilitation Engineering Laboratory 6
2.1.4 Recent Operations 8
2.2 Lyons and Trimby IQP 8
2.2.1 Purpose 8
2.2.2 Findings 9
Chapter 3: Problem Statement 12
Chapter 4: Methodology 13
4.1 Lyons and Trimby IQP 13
4.2 Other Ideas 14
Chapter 5: Project Results 16
5.1 Rehabilitation Engineering Laboratory 16
5.2 Project and Contact Database 19
5.3 Website Update 25
5.4 Newsletter 28
5.5 Event Considerations 30
5.6 10th Anniversary Event Proposal 33
5.7 Marketing and Management 36
Chapter 6: Project Summary 39
Chapter 7: Future Recommendations 41
7.1 Website Maintenance 41
7.2 Project Database 41
7.3 Rehabilitation Laboratory 42
7.4 Outreach 44
References 46
Appendix A: RESNA Standards of Practice 49
Appendix B: Rehabilitation Laboratory Floor Plans 51
Appendix C: Database Instructions 53
Appendix D: Potential Local Affiliates 55

List of Figures

Figure 1 – Recommended Floor Plan 18
Figure A1 – Original Floor Plan 51
Figure A2 – Recommended Floor Plan 52
Figure A3 – New Field Star Mark 53
Figure A4 – "Add New Field" Column 54
Figure A5 – Changing Data Type 54

List of Tables

Table 1 – Database Fields 21
Table A1 – Potential Local Affiliates 55

Chapter 1: Introduction

Assistive technology (AT) is a type of technology that aids persons with disabilities in performing desired tasks. The definition of an assistive technology service can be found in the Assistive Technology Act of 2004 and is as follows: "…any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology device" (Assistive Technology Act of 2004).

Although there are many local centers in Massachusetts that work with assistive technology, very few of them specialize in the design and modification of AT devices. Occasionally, it may be enough to simply advise individuals with disabilities on matters related to assistive technology and aid them in the purchase of commercial products. Realistically though, this is not always the case and a lack of technical knowledge or a means of physically producing a device often makes it necessary to contact another AT center that specializes in design and manufacturing. This lack of expertise outsources the problem and decreases the possibility of creating an adequate solution. Therefore, it seems best to have a specialized regional center, which would be able to generate an interdisciplinary team, customized for each assignment. This method will likely produce a solution to all presented needs, while doing so in the fastest possible way, since all collaboration will be done internally to the Center.

The Assistive Technology Resource Center (ATRC) at the Worcester Polytechnic Institute (WPI) was created in 1999 when the Fairlawn Foundation of Worcester awarded the Rehabilitation Engineering Laboratory at the Worcester Polytechnic Institute a grant intended to be used for the development of a specialized AT hub. The mission of the Center was "to foster the use of assistive technology through collaboration with professionals associated with local and regional clinical, educational, governmental and social service organizations that serve persons with disabilities"

("About Us"). Ever since then, the ATRC has been a beacon for assistive technology both at WPI and in the region as a whole.

After being in existence for ten years, the operation of the Center was formally re-evaluated by two WPI students, Christopher Lyons and Paul Trimby, who presented their findings as a part of an Interactive Qualifying Project, which was published in 2008. They determined that some aspects of the ATRC have become outdated and in order for the Center to remain working as planned, some issues need to be addressed in the very near future.

The purpose of this paper is to implement some of the recommendations that the two students proposed, as well as expand on their analysis by investigating other problem areas and suggesting new remedies. In addition, the team's goal was to also help re-structure and re-organize the ATRC, so that both its existence and desired function can be easily preserved in the years to come.

Chapter 2: Background

2.1 ATRC Background

2.1.1 Establishment

Assistive technology services are usually provided by a large number of dispersed groups of organizations, as opposed to being consolidated in a single rehabilitation center. This structure impedes the formation of a centralized assistive technology hub and the utilization of interdisciplinary assistive technology teams.

"The Development of a Regional Assistive Technology Resource Center" (WPI ATRC)

The ATRC came about as an idea proposed by Professor Allen Hoffman and Professor Holy Ault in 1998, which was meant to address the regional need for a centralized information resource for rehabilitation professionals, as well as the need for a provider of technology-based resources for the design or modification of customized assistive technology devices. Predating the ATRC, most of the rehabilitation engineering at WPI has been conducted in association with organizations outside of the Worcester area that had on-staff technical expertise, such as the Massachusetts Hospital School (MHS) in Canton, MA. Therefore, assistive technology projects were not something new to WPI when the Center was created. Nevertheless, the inception of the ATRC was not simply intended to put a name to something that already existed but instead, it was proposed so that a new, regional assistive technology hub could be created.

Since 1999, with the help of a grant from the Fairlawn Foundation, the ATRC has been a part of the Rehabilitation Engineering Laboratory at WPI. The Center's goal is best described through its mission statement, which appears on the ATRC's website. It reads as follows:

"*The mission of the ATRC is to foster the use of assistive technology through collaboration with professionals associated with local and regional clinical, educational,*

governmental and social service organizations that serve persons with disabilities. The ATRC disseminates technical information regarding the availability and use of assistive devices. When an appropriate commercial device is not available, the ATRC will collaborate with cooperating organizations in developing modifications to existing devices or the design of a custom device. The ATRC focuses on mechanical and electro-mechanical devices."

"About Us"(WPI ATRC)

There have been several documents that have influenced the way the Center has operated since its creation. Firstly, the "Technology-Related Assistance for Individuals with Disabilities Act of 1988" has been used as the defining template for assistive technology. This accepted definition is described as follows:

"*Assistive technology can be defined as any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities*."

The Technology-Related Assistance for Individuals with Disabilities Act of 1988

Furthermore, RESNA (Rehabilitation Engineering and Assistive Technology Society of North America) has compiled a set of rules in a document named "Standards of Practice", which is intended to be used by AT centers worldwide. The twenty-four rules that compose this document can be found on the RESNA website (Standards of Practice) and they assist AT professionals in serving their clients in a proper manner. These rules have been developed in effort to promote a code of conduct with regard to Assistive Technology. This document can be found in *Appendix A: RESNA Standards of Practice* and has been used by the ATRC since its inception.

2.1.2 Progression and Results

Although assistive technology services a number of different disabilities, the ATRC has been specializing in technology related to physical handicaps. The Center has and continues to provide large scale engineering design projects, which are often used by undergraduate students as a way to fulfill WPI's graduation requirements for an Interactive Qualifying Project (IQP) and Major Qualifying Project (MPQ). Under the guidance of Professors Allen Hoffman and Holly Ault, over sixty major projects have been completed during the last decade. These projects have produced results, which have allowed for individuals with disabilities to perform certain tasks which may have previously been difficult or even impossible due to a certain handicap. These projects have undoubtedly been one of the main legacies that the Center has produced over the years.

One of the essential elements for the expansion and continued development of the ATRC, or any assistive technology center in general, is direct participation with other organizations related to the AT field. Cooperation provides additional resources, funding, and networking, which allow for these Centers to embrace new projects and expand their regional importance, which ultimately is the goal of the ATRC. In addition, close collaboration is often required in order for a new product to be successfully implemented.. At WPI, the ATRC is affiliated closely with Engineering Projects in Community Service (EPICS). EPICS is a program that utilizes teams "comprised of multiyear, multidisciplinary students that solve engineering and technology-based problems for these partnering organizations to create solutions that can be used by the organization." This program was founded four years prior to the ATRC, in 1995, at Purdue University in West Lafayette Indiana and it helps to bridge the gap between student technological devices and the surrounding community. It is the goal of EPICS to "broaden students' education to include experience with design as a start-to-finish process by defining, designing, building, testing, deploying, and supporting real systems

[and to] bring affordable engineering expertise to community service and education organizations". EPICS and the ATRC work jointly on common projects related to assistive technology and utilize the same facility, which is proof of the aforementioned affiliation.

"About EPICS" (WPI EPICS)

Finally, in addition to projects, the ATRC is known for its community involvement. The Center participates in seminars and other programs such as Camp REACH, "an award-winning summer residential program for girls in Massachusetts who are entering 7th grade and who are interested in learning more about careers in engineering and technology" (Welcome). The ATRC also works to inform potential contacts about the services it offers by distributing newsletters and holding annual events. Contacts are vital for networking and developing design ideas and without them, the function of the Center would be partially compromised.

2.1.3 Rehabilitation Engineering Laboratory

The Rehabilitation Engineering Laboratory is a one thousand and thirty square foot area, which was set aside for the ATRC when it was first founded. This facility, located on the first floor of Higgins Laboratories (HL 129) is used for the design and manufacturing of devices, which are intended to aid individuals with disabilities. The room is the first of two adjacent labs in the Higgins building, dedicated to Rehabilitation and Biomechanics. It is where the ATRC designs and produces its assistive technology devices.

Higgins Laboratories is one of the busiest buildings on campus. This is because it is the home of the Mechanical Engineering department, which is one of the oldest and largest departments at WPI. As this building sees a great amount of traffic and is visible from one of the main corridors, it is important that the lab remains well organized so

that students may easily locate the necessary tools and materials to accomplish their engineering goals. Also, for safety reasons it is imperative that certain areas of the lab, such as the eye wash station and the cabinets which hold cleaning supplies or flammable liquids, be free of clutter and well labeled. It would also be advantageous to attract new students, as well as keep current students interested in the lab by providing a safe and well organized working area.

As new students take interest in attending WPI, tours across campus make stops in the major buildings, such as Higgins Labs, as well as some of the laboratories on campus. When one considers what might attract a student to a particular department, the condition of the available labs is a significant factor in the decision-making process. With the lab in better looking and working condition, the prospective students can get a good feel for what can be accomplished through lab use. Therefore they may take more interest in the Mechanical Engineering department or even the ATRC, according to their first impression of the available lab space and the type of work that goes on there.

The lab is primarily used for Mechanical Engineering courses, Major and Interactive Qualifying Projects and graduate student research. The classes that routinely use this space are Introduction to Engineering (ME1020), Introduction to Engineering Design (ME2300), and Rehabilitation Engineering (ME3506). These courses require students to complete projects which are directly related to rehabilitation engineering or assistive technology and these projects are typically tested and manufactured in the lab. Additionally, the lab becomes home to students completing their AT-related Major Qualifying Projects, who can be found working in the lab at nearly any given time of day, year-round. Finally, Engineering Projects In Community Service (EPICS) is a student group that also works in the Rehabilitation Engineering Laboratory and focuses on accessibility and assistive technology.

2.1.4 Recent Operation

The Center has continued to run as originally planned during the last several years. It has provided service to individuals with disabilities through different design projects. It has also forwarded information to people, regarding assistive technology. Most importantly, the Center has done all of the tasks mentioned above with the proper conduct as required by RESNA's "Standards of Practice". Nevertheless, the ATRC administration determined that certain areas of the operation of the Center can be improved. Professors Hoffman and Ault requested that the ATRC be analyzed, so that potential issues can be pinpointed and solutions be proposed. It was then determined that there are several areas, which were either out-of-date or simply difficult to manage. Therefore, plans were made to work on those issues, so that the Center can operate at its full potential in the near future.

2.2 Lyons and Trimby IQP (2008)

2.2.1 Purpose

To ensure the efficiency and efficacy of the operations of any organization, it is often necessary to execute a periodical review of its operation and its overall status. In order for the review to be complete and accurate, it is necessary to fully understand the past and present operations of the organization being reviewed. When it comes to the ATRC, much of this information is dynamic in nature and subject to change, since it has no established concrete form. Furthermore, it is necessary to well understand where the organization is headed and what its future will look like in order to be able to create comprehensive solutions, which will not be outdated in a few years. Therefore, the ATRC administration decided that it was necessary to find the best way to carry out such an evaluation, which would help optimize the future of the Center.

Christopher Lyons and Paul Trimby undertook this evaluation as part of their Interactive Qualifying Project. Their goal was to aid the ATRC by performing the

abovementioned evaluation and by recommending solutions based on their findings. After several months of researching the Center and its operation, sorting through information, and making conclusions to the way the ATRC operates, the two students described their findings and recommendations in a paper of over one hundred pages (*Lyons and Trimby*). This paper proved to be very critical for the present project since it generated the majority of the ideas which the current study was in charge of implementing.

2.2.2 Findings

The Lyons and Trimby report concentrates on explaining that in order to have continued success, an organization must expand as much as possible, it must keep organized in the years to come, and it must maintain its work at a high level of professionalism. Following this assumption, the two students suggested numerous approaches that could potentially optimize the future operation of the ATRC.

First, their paper suggested that the visual appearance of the laboratory space be improved. It states that the area appeared "cluttered, disorganized and unkempt" (*Lyons and Trimby, 50*). They recommended that the tools in the laboratory be re-arranged periodically, that a once-per-week walk-through is performed in order to maintain neatness, that the counters are kept clean and clear from excess clutter, and that organizing the past projects in designated areas should be done regularly to maintain the desired organization of the laboratory.

Next, the report recommended implementing a centralized database of all projects and contacts. Such a database would greatly improve the organization of the ATRC by putting a large amount of information into a designated location. They added that this information needs to be easily usable and updateable, since the projects and contacts lists grow steadily as more and more time elapses.

The students also discussed the importance of updating the ATRC website. They state that the website provides the initial means of communication with organizations and future clients. They recommended that the site be updated with new projects, announcements, and activities on a regular basis, so that the recent doings of the Center can be displayed as proof of its importance and growth.

Improving the way the ATRC markets itself is the next topic discussed in the Lyons and Trimby paper. The students advised that the Center needs to set a distance limit for how far away it would like to have affiliates, as well as clientele. Once that is determined, it would be possible to begin compiling a list of organizations with similar interests that could become prospective affiliates, which in the long term would help spread the Center's name and resultantly improve its reputation. It is also mentioned that the ATRC could benefit from publishing more information on its activities and operation, since this may attract new clients and partners who may not have been aware of the existence of the Center in the past.

Operations and management was also discussed. Selecting defining roles within the organization was suggested, in order to allow for a more even spread of responsibilities related to the necessary objectives. While the current administration currently fulfills the managerial, operational, academic, and public relations positions of the ATRC, there is a lack of free time and consequently a lack of ability to work in a way that would optimize the Center's operation. Students therefore are suggested as a possible solution, since they can help in better spreading the workload by performing simple tasks on a regular basis.

Finally, according to the paper, funding will remain a principal area of interest if the Center is to continue to exist. The report suggested that a database needs to be compiled, including any grants already procured, as well as potential grants that would be beneficial to seek. WPI already has a grants database that can be used as a start to investigate possible sources of funds. Producing a cash flow projection tool was also

encouraged, since it could be used for long range financial planning. Lastly, the two students also stated that a comparison between the ATRC and other centers may be beneficial, since it would help gain an insight as to how other centers approach acquiring and maintaining external funding.

Chapter 3: Problem Statement

After the ATRC Directors realized the need to assess the Center's operations, an analysis was done by Christopher Lyons and Paul Trimby as an Interactive Qualifying Project. This study found that there were numerous means of improving the inner workings of the ATRC. The objective of the present project was to examine this analysis and start implementing its recommendations. Final objectives included organizing and allocating the space of the Center's facilities, developing a project database, updating the ATRC website, creating a spring newsletter, organizing an event to celebrate the 10th year anniversary of the ATRC, and optimizing marketing and management. With these objectives implemented, the Center should operate more efficiently and should flourish in the years to come.

Chapter 4: Methodology

4.1 Lyons and Trimby IQP

The work of Lyons and Trimby recommends a variety of good methods for how the facilities and information should be managed and how new contacts can be acquired. However their paper does not go beyond these recommendations and onto physically fulfilling these goals. Therefore, this information had to be manually sorted through in order for our team to determine which of the specified solutions should be implemented and for what reason. It was also necessary to keep in mind that this project had a set timeline and even though all of the remedies listed in the previous IQP are desirable, it would not be possible to fully execute all of them.

First, the team agreed that one of the concentrations of this project should be the Rehabilitation Engineering Laboratory. The importance of this facility does not end with the fact that it is used for countless projects related to assistive technology. The laboratory is also vital since it is used to attract publicity to the ATRC and the services that the Center may provide to the community. The problem with managing the facility is directly related to the large number of people using it. The lack of encouraging cleanliness and continuously monitoring the use of the facility results in clutter and disorder. It is not always clear what projects are ongoing in the Lab and what projects are old and ready to be disassembled for parts. This results in old projects being stored for unnecessarily long periods of time, while storage space is limited. Furthermore, tools and other goods are often unaccounted for and not keeping track of such items endangers the functionality of the laboratory. Therefore, it is crucial to clean-up the Lab and reorganize it, in order to minimize confusion and maximize accountability.

Next, creating a projects database would be very beneficial to the Center. Previously, information about past projects was mostly available but it was by no means organized. It was possible to find old reports but in order to do so, one had to look in

many different places, which only highlighted the need to compile all previous publications, related to the ATRC. In addition, creating this database allowed for the possibility to also create a contacts database, which could easily be structured to function side-by-side with the projects database. Once all of these data are compiled, it would be much easier to find an old project, generate mailing lists using the contacts in the database, or even sort through completed projects in order to generate statistics on what types of disabilities the Center has worked with.

Updating the ATRC website was agreed to be the next critical area. The modern world uses the Internet on a daily basis, which implies that the Center's website could be the first means of communication with potential clients, affiliates, and sponsors. Therefore, the website must be maintained in a way that would ensure the validity of the posted information, as well as a way that would preserve the image of the ATRC as an expanding local hub of assistive technology. This translates into updating the website regularly. The website was last updated over four years ago, highlighting the need of an update to be done immediately.

Finally, the team determined that addressing the management and marketing of the Center would also be important for its future success. Currently, the ATRC operates well in the sense that it produces good quality results, it continues to expand through new contacts and affiliates, and it does all this in a professional manner. It does appear though that this process can be improved in order to optimize the value and importance of the Center in the region. This can be achieved by enhancing the workload distribution and by reaching out further when it comes to finding new clients and partners through implementing new methods and improving the existing ones.

4.2 Other Ideas

The second most vital input that was needed in order to complete a thorough performance review of the Center came from individuals previously and currently

involved with the ATRC. These people were few but their intense involvement with the Center provided a great amount of insight that was gained over many years of working with the ATRC and its clients. They were able to share many of the ideas and suggestions that were brought forward in the past and they were also good contacts when it came to answering questions that arose over the timeline of this project. At the beginning of the project, Professor Hoffman had a general expectation of what areas needed to be improved. He also encouraged the team to expand on his pointers and hopefully come up with improvements to the discussed remedies.

The interaction between the ATRC administration and the team not only resulted in expanding the suggestions given by Lyons and Trimby but it also generated some new ideas, which were important for the ATRC's future. The necessity of sending out periodic newsletters to the WPI community and to the ATRC contacts in the region was well established. Sending out the newsletters has been neglected in the recent past; therefore, this became one of our main objectives.

In addition, it became clear that not many ATRC-hosted events have been organized or even planned in the last few years. Events of this type can help educate people about the Center and its activities and they can also be a good method of finding new sponsors and expanding the Center's clientele. Therefore, it was necessary to plan an event in the very near future, which would ideally take place at WPI and would deal specifically with assistive technology.

Chapter 5: Project Results

5.1 Rehabilitation Engineering Laboratory

Due to the large number of people presently using the facility, reorganizing and cleaning the lab required appropriate timing. The students who work there usually have many projects in progress with various items dedicated to each project. The group wanted to make sure that none of their work got accidentally lost. It was decided it would be best to wait until near the end of D-term to begin this reorganization. Since the goal was to not only clean the area but to make sure that it stays clean in the future, a plan of action was devised in order to make that possible. First, since the lab is in use for most of the day, the reorganization activities were scheduled at night. The team then decided to split up the lab into two different sections, so some of the stored items and materials, such as wheelchairs, could be moved to the section, which was not undergoing maintenance. Once this was done, the work area became clearer and that made it easier to find a place to start.

Everything on the countertops was organized and placed in drawers. Wheelchair parts were moved to low cabinets. Hazardous materials were locked into a high cabinet where nobody would encounter them unintentionally. Several expensive pieces of equipment were moved as well and placed in a cabinet that was able to be locked. The keys to these cabinets are held by Professor Hoffman, so whenever the locked-up items are in use, someone in the ATRC administration will be aware of it.

With everything essentially organized, the group moved onto labeling the facility. It was determined that it should be a managerial task to amend the labeling system, as well as to update the project posters displayed in the lab, since most of them were rather old and new projects were being completed. The labeling structure was organized around the individuals who spend a lot of time in the facility. It was intended that the labels were easy to read but concurrently easy to re-organize, if necessary.

Also, upon taking inventory of the drawers and cabinets, it seemed that a better organizational scheme could be devised for the lab, in order to optimize space. A simple solution was grouping similar objects together, so that any two different drawers would not contain the same items, which would also improve the labeling quality.

A label machine was purchased and the team began by making sure the labels did not leave any marking on the wooden drawers and cabinets. These tests established that the labels left no trace on the furniture. As labeling began, it became clear that this was a good solution to keep the facility organized. The new labels not only increased aesthetics dramatically but they also performed just as well as writing on blue *Painter's Tape*, which was the prior method of labeling.

Next, a floor plan of the active lab space as it appeared at the time was created. An updated floor plan was also produced, which was meant to optimize efficiency, as well as increase safety. It was meant to serve as a suggestion as to how the lab should look like in the future. It is included below in *Figure 1* and also in *Appendix B*: *Rehabilitation Laboratory Floor Plans – Figure A2*. This proposed floor plan also concentrates on the improved organization of the movable tables in the lab, so that available space is best utilized, while obeying safety precautions.

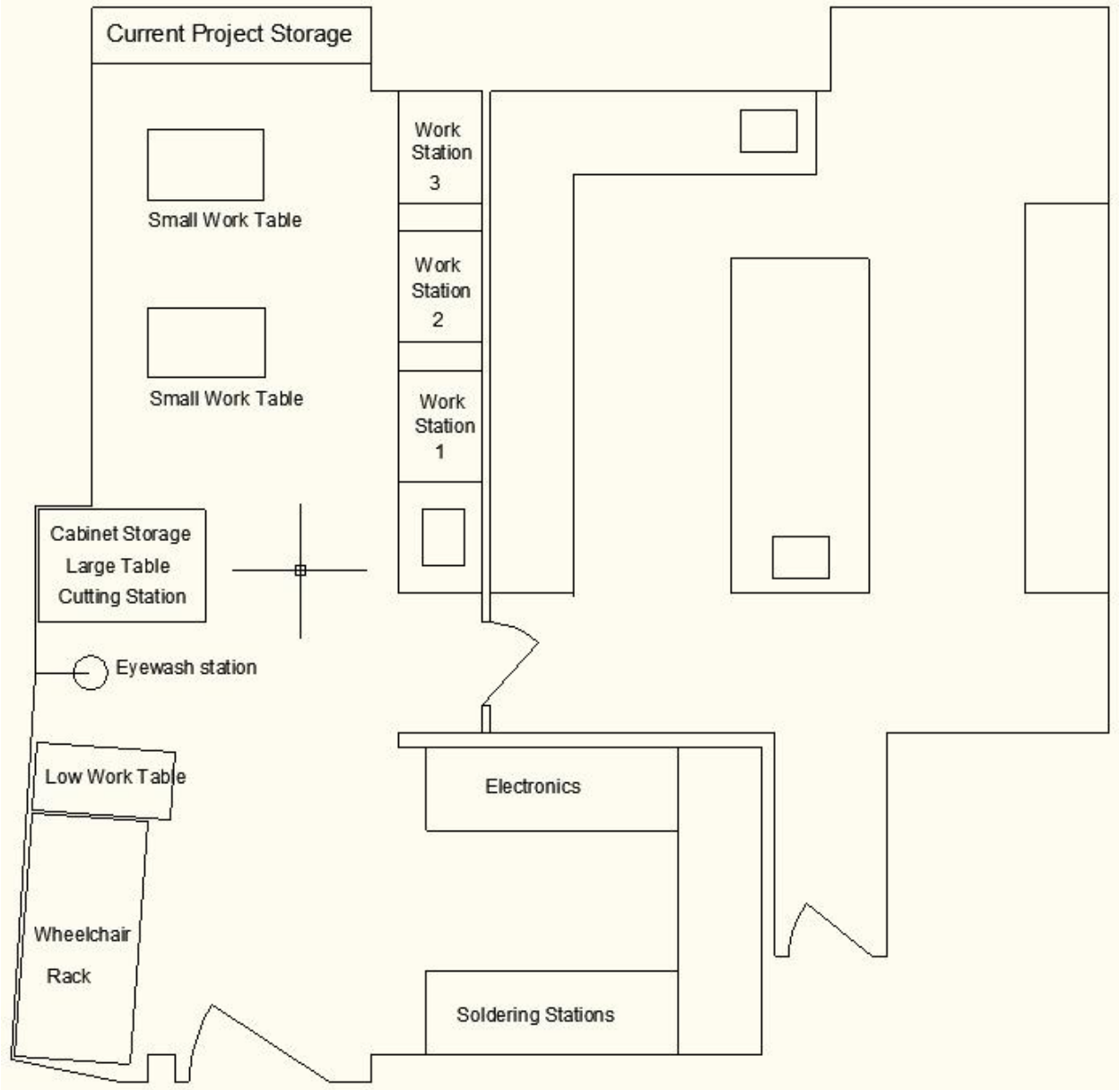

Figure 1 (A2) – Recommended Floor Plan

This floor plan moves several items around the room, allowing for more project space, in addition to organized work areas. At the moment, there are three designated work stations, as well as plenty more table space for other projects to be worked on. There is an allocated electronics section, to do work and find materials specific to that

area. Also shown are cutting and soldering stations. These areas are required since these activities require a lot of attention, and could be potentially dangerous.

After re-organizing of the facility, it was decided that updated posters should be placed in the lab in order to display some of the more current projects associated with the ATRC. The old posters were removed and the existing ones were evaluated to determine which were most presentable. Several were chosen by Professor Hoffman to be of particularly good value, so these were displayed along with a few selected by the group.

The new look of the laboratory now includes brand new labels, re-organized work areas, and updated posters. After the change was made, the overall cleanliness and safety of the lab was improved and the visual impact has also increased substantially. This will hopefully lead to more people wanting to spend their time in the laboratory, which would contribute to the success of the ATRC.

5.2 Project and Contact Database

One of the biggest tasks undertaken was that of creating a database for all of the major projects completed through the ATRC since its establishment in 1998. This was especially difficult due to the large range of years and information that had to be tracked down. The database had to be organized in a way that would allow for the vast amount of information it contained to be easily accessed. As a group, it was decided that the initial material contained should include the date of submission, the project title, the students who were involved, the advisors, and the abstract.

A contact database was also proposed. After looking at the different programs available, it was quite clear that it would be extremely easy to include this data collection in the same file as the project database. This would keep the two items more organized and therefore more easily updatable. The contacts may consist of personnel from similar organizations, alumni who worked on past projects, organizations that have

sponsored projects, or other people who have been involved with the ATRC over the past years.

Data collection for this project was a considerable undertaking since some of the information involved was up to twenty years old. Guided by Professor Hoffman, the team began searching through past reports that he had cataloged in his office. Each report was reviewed and recorded, and the data was organized into a word document so that it could be easily formatted as the project progressed. As the team became more familiar with the projects and what they involved, it was decided that a new field should be included onto the database – "sponsors". Once that was done, it became possible to contact any organization that had worked with the ATRC in the past.

As this information began to grow, it became clear that it was time to decide precisely what program would be used for the management of the database. The group determined that there were a few necessary characteristics that should be taken into consideration. First, the database had to be easily obtainable by the Center administrators and any students who wished to view the information. Second, it was necessary to guarantee that the software would remain supported in the future, so that the database would not have to be moved into other software title. Finally, it was very critical that the software was user-friendly, so that in the future it would be easy to train personnel in its use. After researching the possibilities, the two software titles which best matched the needs of the project were Microsoft Access and Microsoft Excel. Since Access was designed to work with databases and it provided more tools for sorting and searching through the data, it was the better choice. Access is also available throughout campus, so it is widely available for free use.

Microsoft Access is a fairly straightforward program but it may take some time for one to get familiarized with its structure. Therefore a new user may not have the immediate knowledge to be able to make substantial changes. A base template was

then designed which had the original designated fields and the process of inputting the already assembled information began.

WPI's George C. Gordon Library was used to find several of the projects, which were not yet located. All previously submitted IQP's and MQP's are collected in the library in searchable electronic form, which made finding the projects related to assistive technology rather easy. Once the projects were found, they were collected, sorted and added to the database. With these additions, the database totaled over sixty projects.

The next logical step was to add the names of the students who worked on these projects to the contact list. This list allows many of the past students to be contacted through newsletters, in attempt to keep them informed about the ATRC. The newsletters will also remind them of the Center's existence, so that they could contact the ATRC in the future with some new project ideas. The contact database is available to the Center's administration, and they can easily add their own contacts to it.

Upon reviewing the database, Professor Hoffman suggested that several more fields are added. Each of these new fields pertained to the type of AT the device produced, as well as to the client and his/her type of disability. Each of these fields were designed as drop down menus, which were intended to aid the sorting of the projects, as well as to guarantee the consistent sorting inside the database.

The list of fields was then expanded to the following (where solid dots represent the fields and hollow dots represent available options for the parent field):

Field	Sub-Field
Date Completed	-
Project Name	-

Field	Sub-Field
Status of the Project	Not Started In Progress Completed Deferred Waiting on Someone Else
Student(s) Involved	-
Project Advisor(s)	-
Sponsor(s)	-
Project Abstract	-
Awards Won by the Project	-
Is the Project on the ATRC Website?	Yes/No (Check Box)
Website Page Name (If Online)	-
Primary Disability	Mobility Cognitive Vision Hearing Speech Muscular Dystrophy Traumatic Brain Injury Spinal Cord Injury Cerebral Palsy Other Multiple

Field	Sub-Field
Targeted Activity Type	Work Education Leisure Daily Living Sports Multiple
Client's Age	6 Years or Younger Child (6-12) Teen (13-19) Adult (20-65)
Client's Age	Elderly (65+) Multiple Ages
Assistive Technology Used	Wheelchair Adaptations Computer Access Prostheses & Orthosis Other Mobility Everyday Living Aids Wheelchair Add-Ons Communications Safety Other
Context Within Which the Device Was Used	Home School Workplace Group Home

Field	Sub-Field
Context Within Which the Device Was Used (*Continued*)	Institution Community Nursing Home Gymnasium / Outdoors Useful in All Context

Table 1 – Database Fields

The last five fields were all suggested by Professor Hoffman. Since the ATRC has worked on a wide range of projects, he felt it best if they would be able to be categorized by these groups. That way, if a new project was offered to the ATRC, it would be easy to find helpful information through similar, completed projects by simply matching the new issue to some of these categories. In addition, the five fields also allow for the improved sorting of the projects in the database, as well as for the enhanced search ability of the entire database.

After this list was compiled and added to the database, every entry was modified to fit into the new fields. While many of the projects were easy to determine, some of these fields would require additional information other than was available in the abstract. Therefore, the more difficult entries were left blank, allowing for someone with firsthand experience to later categorize them correctly.

As new projects are launched, they can be added to the database by whoever is working for the ATRC at the time. Since Microsoft Access isn't used as often as others common titles, the team has written up a guide on editing and maintaining the database which is included in *Appendix C: Database Instructions*. This will hopefully make the process of adding all the new projects as easy as possible and keep the database organized in the future.

5.3 Website Update

The ATRC website is a valuable tool for broadcasting information about the Center and its activities. It includes sections about completed AT projects, journal articles and conference papers documenting work conducted within the ATRC, old newsletters, and more. All of those are a testimony to the Center's activity and importance. In addition, the website provides information about some of the affiliates of the ATRC, as well as links to important assistive technology websites and laws. Displaying outdated information would give the impression that the Center was not currently active. Therefore, it is absolutely critical for the website to be updated regularly, in order for the ATRC to be able to showcase its image and reputation correctly over the largest community in the world, the Internet.

Unfortunately, in the past, it has proven difficult to update the website for multiple reasons. First, the ATRC administration does not have direct access to the files. This brings about the necessity to deal with other individuals, in order to gain access to the website data and to overwrite the old files with the new ones. Needless to say, that complicates the process, which in terms makes updating the website more time consuming. In addition, there was no set individual who put in charge of making changes to the website. Therefore, the ATRC administrators have to free up time in their busy schedules to contact someone about the necessary changes or to make the changes themselves. These issues, combined with the fact that web editing is usually difficult and time consuming, resulted in discouraging the process and rendering the website outdated.

Updating the website was immediately labeled as one of the main objectives of this IQP when the project was first started. The website was last edited in December of 2004, which is more than four years ago. Therefore, changes had to be made, while keeping in mind that the project had a set timeline. The website categories were examined and prioritized by what sections were in most need of being updated. Once

the decision was made and Professor Hoffman's approval was received, it was time to gain access to the website files and to begin editing.

There may have been multiple ways to acquire access to the ATRC website but this paper will only describe the approach that was used in this report. The first step was obtaining a contact that would be able to work with the team in making the website update possible. In the case of this paper, the contact for this project was Siamak Najafi, the Director of Research Computing and Academic Departmental Support, who was recommended by Professor Hoffman. As soon as the team met with Mr. Najafi, it became clear how it would be necessary to go about editing the website for this project. First, all of the files would be copied from their default location to a secondary location where all the changes would be made. Next, the team would receive access to these copied files and would modify them until the proper results are obtained. Then, Professor Hoffman will be asked to approve the changes and once this point is reached, the team would contact Mr. Najafi again and he would overwrite the default website with the new, updated files.

Once the method of updating the website was determined, it was necessary to investigate what software titles were available on-campus, which would aid in this process. The very same programs used in the past were chosen, since they are easily accessible and also user-friendly. The titles chosen were Adobe Dreamweaver, which would be used to edit the web pages and WinSCP, which is necessary in order to connect to the server where the files are stored.

Now that the plan of action was fully developed, it was time to begin working on the website. The first update involved the two lists of projects on the website called 'Current Projects' [*current.html*] and 'Past Projects' [*past.html*]. The idea behind having these two pages is good, since it allows the ATRC to show to what extent it is occupied at the moment the site is visited but having a 'Current Projects' page would also imply that the website has to be edited monthly, weekly, or even daily, which as described

above is difficult and not desirable. Therefore, it was decided that the two pages should be merged into a single page called 'Project Database' [*projects.html*], which would showcase all of the assistive technology projects, which were completed in the past. Adjustments were made accordingly.

Next, it was necessary to determine which projects will be listed in the 'Project Database' page and how they would be organized. Previously, the projects were organized by type. This seemed vague since type can refer to a wide range of things, such as the materials used in the projects, for instance. Therefore, it seemed more fitting to organize the projects by year of completion. After re-coding the page to show titles ranging from 1989 to 2008, it was time to add the projects.

The project pages were designed to look mostly identical to the ones which were already on the website. The only exception was removing the date of completion information from the right side of the page and displaying the year that the project was submitted above the names of the students who were involved. Using this new template, nearly seventy new pages were created. The old files were removed from the 'Projects' folder of the website and replaced by the *projects.html* file and by the new pages for each project. Then, each of these pages was linked to the 'Project Database' [*projects.html*] page according to the year of completion. In addition, it is worth mentioning that the 'Images' folder inside the 'Projects' folder of the website was examined and all of the pictures it included that were not linked in any of the project pages were deleted. Also, the new project page file names were generated using key words from the project names, spaced apart by the 'underscore' symbol. For example, if the project was called 'Important Project', then the file name would become *important_project.html*.

After making sure that all project names in the 'Project Database' file [*projects.html*] were linked to the correct location and that the dating was accurate, it was time to move on to updating the 'Newsletters' page. Once the old newsletters

were obtained from Professor Hoffman, they were renamed to the *YEARseason.pdf* format as the previous ones [Ex: *2006winter.pdf*] and then they were uploaded to the 'News' folder of the website. Next, the 'Newsletters' page was edited to account for the new files.

Finally, the last aspect of updating the website that needed attention were the publications listed in the 'Journal Publications' page, located in the submenu of the 'Projects' link. This page lists all the articles that were published by the ATRC administrators and other students regarding assistive technology, rehabilitation engineering, and technology dissemination. The newest entry before the edit was from the second half of 2001, so there were many more papers that had to be referenced in this page. After Professor Hoffman sorted through the publications and determined which ones he wanted to post on the website, they were quickly listed onto the page and the ATRC website was finally ready to be updated. The last step was handing the files over to Siamak Najafi, who would then overwrite the outdated website with the new data.

5.4 Newsletter

The newsletter is a key marketing tool published biannually by the ATRC with one edition typically distributed in the fall semester and another in the spring. The newsletter disseminates information on recent projects done for the aforementioned courses and news from the EPICS group. It also informs readers about the key personnel in the lab and provides their contact information.

As a journal of events that take place in the ATRC, there is no substitute for the newsletter. It is one of the few ways that the ATRC achieves its mission of disseminating technical information to the public on assistive technology. Unlike the website, which primarily defers static information, the newsletter is dynamic and it is usually linked from the website. The newsletter is a much more aggressive means of advertising in

that it sends information directly to a targeted audience instead of relying on loyal participants to discover its link on the website. If a newsletter was not produced, the WPI community would be largely unaware of projects and achievements that may be ongoing or taking place presently. Also, having a collection of newsletters from previous years is a way to chronicle the achievements of the organization in a way that is easily absorbed for those wanting a general idea of what students do in the lab without having to delve into lengthy reports.

Some minor journalistic efforts were essential in order to update the newsletter. Information needed to be collected on the occurrences in the ATRC for the past year including coursework, EPICS projects and qualifying project work. This information was provided by the current ATRC manager and Professor Hoffman, who had instructed the courses which required student projects in the lab. Also included would be an article in the newsletter to recognize the Center manager who was extensively involved in the day to day operation for the past two years and would be leaving his position at the end of the year. Lastly, it would also be advantageous to display other recent publications produced through the ATRC to guide readers towards further information on assistive technology. Once the topics were chosen that would best exemplify the work done in the ATRC, it was a matter of constructing insightful articles that would demonstrate the ATRC in its best light.

After the context of the newsletter was developed, assembling the articles in a way that would spark a reader's interest became the next challenge. Presenting all viable information in a manner that was visually appealing is of great importance so as to entice an audience to read the newsletter. In the world of advertising, decisions are made about a product within a very short amount of time and its overall aesthetics greatly affect the ultimate acceptance or rejection of its purpose. The newsletter is generally printed on two pages, complete with photos of recent work alongside the articles. As photos are forms of informational media that are readily accessed and

require little time to process mentally, they can be a key selling point of many publications. When it comes to technical devices, photos are usually the easiest way to convey to a reader how a finished device may function, if only implied by form. Although it was apparent that including pictures in the newsletter would be best, finding room for them was another issue entirely. It became necessary to compress the text of the articles and reduce the amount of "white space" such that this other information may be let in.

The current method of distribution is to email the newsletter to a contacts list that has been developed over the years and to print copies that are posted on campus. The contacts include former students and partner organizations, including other similar organizations that the ATRC has cooperated with in the past. In an effort to extend the ATRC's reach to the community, personal emails will also be sent to organizations that the ATRC has not worked with before. The email will introduce the ATRC's services, remark on its tenth anniversary of research in assistive technology, offer a copy of the latest newsletter, and include an invitation to join the mailing list, in case the recipients were inclined to do so.

5.5 Event Considerations

Holding an event is a unique marketing opportunity that allows members of an organization to learn, share, and network on a personal level. Any organization thrives on the people that utilize it. It is important to gather a list of active members, in order to update them on new opportunities available and to distribute useful information to them. In addition, an event can be used to welcome newcomers as well as get in touch with former associates who may be more distant from other forms of marketing media.

Events can be categorized as celebratory, promotional, commemorative, or educational and the distinction is made based on the objective of the event. Celebratory events may be held in honor of a birthday, wedding or special date and can

be structured just like informal parties where refreshments are served. A promotional event might be a product launch or fashion show, where the aim is to ultimately sell a product. Events held to honor an accomplishment or possibly the deceased are commemorative and can include a wake or special dedication. Dissertations or conferences that supply facts are educational events.

(What is Event Planning?)

An event for the ATRC ideally would be a combination of what may be deemed celebratory and commemorative. The goal would be to acknowledge ten years of work in the ATRC and to gather an event to celebrate the success of those years. Promotion is also referred to as marketing communication, and its purpose is to inform, to persuade, or to remind. Although it is not a direct goal of the event, publicizing the ATRC's history of innovative community outreach may also promote its services by informing a target audience about recent accomplishments and advances, persuading them to seek collaboration with the ATRC, and reminding them of past work.

Holding an event will increase awareness of the ATRC's mission as well as congratulate involved parties on their achievements and thank them for their services in support of the ATRC. This is a part of maintaining good public relations. Keeping positive public relations is the way of assuring a satisfied client base that is pleased with the services rendered and happy to do repeat business. Public relations are also a form of advertising that perpetuates itself. By maintaining recurrent contact with a client base with real information that is delivered in a well-timed manner an organization can generate a "buzz" that circulates among principal members of the target audience and can reach additional members of a similar demographic that had previously not been considered.

(Public Relations Tips for Your Small Business)

There are a number of steps one should take in developing a public relations plan, the first of which are to define objectives, assert how the organize should be

identified, and decide on key facts with which to meet those goals and guide an audience's perception. In the ATRC's case, the goals are to attract more students to get involved in the ARTC, either through EPICS or through some of the courses offered in rehabilitation engineering, and to pique interest in the work done in the ATRC by other organizations in the community, former associates and potential affiliates alike. Once the basics have been determined, one may move forward with a strategy, and consider some tactics. A strategy would entail how to approach meeting the chosen goals and what is intended to be publicized, and tactics may describe the means of publicizing it, such as speeches, articles, or newsletters. A solid public relations plan can mean the difference between impressing clients in the professional realm or being regarded as an organization that is socially lacking in customer affairs.

An important tool in investigating the efficiency of hosting an event is in defining measurable outcomes. Some measurable outcomes may be number of professional and student attendees, number of returning alumni or prior project collaborators, or any revenue accrued. These measurements can help gauge audience satisfaction aid in predicting its resulting impact on the organization.

A planning committee composed of Professor Hoffman, Professor Ault, the center manager, and whoever else they see fit, including organizations that the ATRC has serviced, alumni who have been involved with the ATRC, faculty that have aided students, and current undergraduates with an interest in assistive technology. Invitations shall also be extended to organizations interested in learning more about the ATRC who may be potentially seeking an engineering based assistive technology solution, as well as other assistive technology organizations at fellow colleges and universities such as those at the University of Massachusetts at Lowell, and the University of Buffalo. Additionally, an invitation will be extended to our partners in Engineering Projects in Community Service program who also utilize the Rehabilitation

Lab at WPI. It may be advertised via flyers in Higgins and other buildings on campus, sending alias emails, personal emails, and placing telephone calls to closer invitees.

Hosting an event draws students closer to the organization and gives other professionals the opportunity to meet and get to know who is behind the innovation put forth by so many projects. Events gain publicity not only for the ATRC but also for WPI, give students the opportunity to gain new knowledge about assistive technology and meet professionals, as well as providing professionals with access to dedicated students that may create efficient solutions to specific engineering issues in assistive technology. Events can be tailored to target any number of different people, but in this case focuses on the students and organizations involved in assistive technology in a way that will perpetuate its next ventures, benefit its attendees and honor the ATRC in a manner that its ten years of service deserves.

5.6 10th Anniversary Event Proposal

Worcester Polytechnic Institute Honors 10th Years of Progress with the Assistive Technology Resource Center

As an active service center in the Worcester area which specializes in for assistive technology the Assistive Technology Resource Center is in its tenth year of operation at WPI. Since its establishment in 1999 with a grant from the Fairlawn Foundation the contributions of the ATRC have been acknowledged by a number of organizations. Devices developed under the auspice of the ATRC have been published in the proceedings of a number of conferences, have received design awards from the James F. Lincoln Foundation, and received the WPI Edward C. Perry Design Awards. One patent application has been filed. Students at WPI have designed, manufactured and implemented nearly seventy projects in the ATRC for example, “Design Construction and Evaluation of a Universal Arm” *(Bagdonovich, Coughlin, and Woyciesjes),* “Slide-Away Lap

Tray Design" *(Burgault and Silva)*, and "Design and Fabrication of a Child Mobility Device" *(Desrosiers, Nielsen, and Trapp)* which each describe novel devices intended for people with disabilities. "Vocational training for the disabled" *(Letourneau and Mellinger)*, "Adapting Educational Programs for Students with Disabilities" *(Gilde, Kosmaczewski, and Maglione)*, and "Campus Safety for Persons with Disabilities" *(Gouveia and Wilusz)* are some other publications that relay AT research as opposed to actual production. The full listing is available through the ATRC website.

It is the intention of the ATRC to invite these students that performed some of these projects and also professional associates, along with current students, faculty and administration to an event to be hosted in the Campus Center Odeum. In so doing, professional and academic networking shall be provided amongst students, faculty and other professionals involved in assistive technology. Here, information for students and professionals alike on past and current technology will also be provided, the ATRC's association with Engineering Projects in Community Service (EPICS), will be introduced, WPI's continued involvement with the community publicized, and recently improved facilities showcased.

Although the theme of the event has yet to be selected, the event with include a brief history of the ATRC and its mission and an overview of some courses at WPI that equip students with an engineering perspective relating to assistive technology. There are currently four themes being considered: "Technology and Education", "Servicing Individuals Disabled by Autism", "Adaptive Technology", and "Assistive Technology: Issues and Solutions". The first potential theme, Technology and Education" explores the various service areas of Rehabilitation Engineering, current methods for developing Individualized Education Plans (IEPs) and Free Appropriate Education (FAPE), as well as recent technology in augmentative communication aids and Information Technology (IT).

The next, “Servicing Individuals Disabled by Autism” will elucidate on autism’s possible causes and its resulting limitations, current methods in evaluating its severity and defining a user’s needs, describe other communicative disorders, and exhibit some recreation aids available on the market today. “Adaptive Technology” will defer on the difference between adaptive and rehabilitative technologies, recent eye-tracking technology and other efforts for the blind and deaf, and the role of engineering in home and worksite modifications.

Finally, in “Assistive Technology: Issues and Solutions” elaboration upon suiting the needs of various populations through the 14 Service Areas, and include daily living aids for the elderly, orthotic and prosthetic implements for veterans and landmine survivors, and recreation aids for children. A keynote address will be given on the major theme.

The event will supply a meal or refreshments, and intermissions for discussing topics with other guests over coffee and inspection of project poster-boards and prototypes located in close proximity to the Odium. After closing remarks, the event will have lasted approximately three and a half hours in duration and will have hosted as many as eighty guests. Those guests representing professional associates will have new directions in assistive technology to reflect on as well as potential contacts to aid in business ventures. Students and WPI would benefit from exposure to currents methods and topics in assistive technology from a professional point of view and discover opportunities to gain more depth in the field, either through association with EPICS, enrolling in a rehabilitation engineering course, or pursuing work experience with a company represented. Hosting an event to celebrate the advancement made the ATRC will help to perpetuate its next ventures in a way that will benefit its attendees and honor the ATRC in a manner that its ten years of service deserves. It is anticipated that the fall of 2009, would be an appropriate time for the commemorative celebration.

Proposed Event Itinerary:

Assistive Technology Today

Campus Center Odeum

1:00-1:30 pm	Registration
1:30-1:45pm	Introduction and Welcome
1:45-1:50 pm	Reading of the Mission
2:00-2:20 pm	History of the ATRC • Establishment and early accomplishments
2:30-3:00 pm	Keynote Speaker
3:00-3:15 pm	Introduction of EPICS
3:15-3:30 pm	Refreshments, poster and device exhibition
3:30-4:00 pm	Servicing individuals based on age and need • Daily living aids for the elderly • Orthotics and prosthetics for veterans and landmine survivors • Recreation aids for disabled children
4:00-4:30 pm	The Role of AT in Education • Communication boards • Computer access devices • Lap trays
4:30-4:45 pm	Recent Projects, call for projects, closing remarks
4:45-5:00 pm	Coffee and dessert, small-sided conversation

5.7 Marketing and Management

The overarching goal of the IQP is to optimize practices in the ATRC, and that begins with proper management. Center management takes on many responsibilities which are meant to keep the ATRC running smoothly. Proper management can greatly increase productivity in the lab as well as effectively market the services provided therein.

It is the task of the Center manager to maintain the lab's functionality and appearance, as well as keeping up with the newsletter and website. The manager will ensure that the lab is free of clutter which may be potentially dangerous if left to accumulate in areas that are designated for cutting materials, or are obstructing access to areas like that eyewash station or fire exits. He or she must also be sure that all equipment is in working order and that the lab is stocked with appropriate materials. Beyond technical concerns, the lab manager also must be aware of keeping the lab presentable for the range of persons admitted into the lab, whether it is faculty, staff, or prospective students and their parents. Finally, the lab manager must also be aware of the out of date on the website and remain abreast of matters pertaining to publishing the newsletters each year. If any of these tasks go untended, they pose threats to the reputation of the ATRC, and may impede its growth as an organization.

On a more personal level, the lab manager is also the person present to answer questions and provide students with advice on projects. As there is a large volume of projects associated with coursework performed in the lab, it is valuable for the manager to be well versed in rehabilitation engineering and assistive technology, as well as have a general background in manufacturing mechanics. Knowledge of disabilities is also of benefit and may help to focus on the human factors in engineering to better suit the needs of the user.

Generally, it is the role of a manager to set goals, plan, organize, staff, direct, communicate and control the happenings of the lab. These tasks can be categorized into three main areas: technical guidance, special projects, and human resources. As a technical manager he or she provides visitors of the lab with advice on how to accomplish their goals with respect to tools and methods of construction. Special projects refer to managerial projects that sustain the ATRC as an organization. These projects are those such as planning EPICS meetings, overseeing newsletter publication, and lab renovations. The final and most challenging aspect is that of managing human

resources. It is here that the manager can encourage and motivate the people that work in the lab. In labs that delegate tasks to a staff, the manager would be responsible for placing personnel in a position reflective of their strengths and preferences. In this way, the manager may effectively boost morale and productivity of a team by providing an enjoyable professional environment.

(The Three Aspects of Management)

Chapter 6: Project Summary

The overall goal of this project was to optimize the operations and management of the WPI ATRC. The team worked on several different tasks which pertained to this objective and made some recommendations as well. Many of these tasks consisted of physical deliverables which is unlike most IQPs that are assigned at WPI.

The project was started by developing an organizational plan for space allocation in the ATRC laboratory. While the overall aesthetics of the ATRC have already increased dramatically, this re-organization will also allow for more renovations to take place in the future. Hopefully, with this space being more organized, additional projects can be completed in a safe and effective manner. In addition to reorganization, a proposed floor plan was created, which, if implemented, should increase the efficiency of the laboratory space management and the overall safety in the facility.

A digital database was compiled, consisting of every AT project associated with the rehabilitation lab completed by WPI students. Having this data neatly organized into a file is virtually guaranteed to greatly enhance the expediency of the transfer of information to potential clients, which could be useful in solving problems similar to those that have been undertaken in the past. Having these projects broken down into categories allows correlations to be shown, which would have not been possible otherwise.

Updating the ATRC website was one of the critical missions of this project. This update was important in order to maintain the image of the Center as an operating and expanding regional assistive technology hub, since it involved showcasing some of the more recent activities of the Center.

The newsletter was also one of the tasks the group was most interested in completing. Since the articles were meant to be current, a section about the work this very team completed was added. Also included were several interesting pieces on

current course projects, MQP's, and even an excellent portion on the current EPICS project. Sending out this newsletter will hopefully aid the ATRC in gaining some positive attention and increasing its reputation throughout WPI and the local region.

The proposal for the anniversary event was intended to spark an interest in the newly updated ATRC, as well as help networking. Celebrating the ATRC's tenth year of community interaction is a very worthy goal. However, since the ATRC's objective is to make information available to all, it wouldn't be truly a celebration of the ATRC without the commemoration of knowledge as well as expertise. Following this approach, the proposal and itinerary previously shown were created.

The marketing and management section of this project was involved in a portion of each of the main goals. While the database is current now, it will be the job of the Center manager to make sure that it stays updated. The lab organization and cleanliness is also directly related to management of the Center. Any future Center manager is strongly advised to read through this document, as well as the Lyons and Trimby IQP, in order to gain some useful insight about tasks and improvements he or she could contribute to the Center.

Chapter 7: Future Recommendations

7.1 Website Maintenance

The first recommendation that has to be made regarding the ATRC website is for it to be updated on a regular basis. As obvious as that is, it is a necessity which would ensure the digital success of the Center in the years to come.

In addition, it is recommended that the same software titles are used as described in *Chapter 5*. Switching between titles may complicate the editing process and the approaches discussed in this report may not be an adequate guide if the software is changed.

Finally, it is worth creating the position of a 'web editor' for the ATRC, so that a specific individual is in charge of all of the editing work on the website. This would result in time being saved, which would have otherwise been wasted getting the necessary access, acquiring the needed software, and having to learn how the website is structured before being able to make changes. It is also recommended that a student be given this position. This person could potentially be recruited as a volunteer from the EPICS program.

7.2 Project Database

The information contained in the database is as complete as the group could make it, yet it still requires some input by Professors Hoffman and Ault. Every field was added for a certain purpose and without having the remaining fields completed correctly, anyone trying to use this database wouldn't be using it to its fullest extent.

Along with completing the categorization of the current projects information in the database, it is imperative that new projects are added and continually updated. Without adding these projects as they are completed, it would become more difficult to keep the database valid. This may create confusion to whether or not a given project is

listed in the database and it may be neglected. While failing to keep the database updated may seem like a small issue, in the long run this would build up creating a much larger problem. Instructions to how the database was created can be found in *Appendix C: Database Instructions*. This guide can be used to better understand the structuring of the data, which in terms will help with the mastering of the software and making future changes to the database.

While continuous updating is a good habit to employ, the team also recommends that only one copy of the digital database remains in use at one time. This might be since the entire Center is not run by only one person. It is possible to utilize a plan that sets rules for who can edit the database, and when this can occur. This could help reduce the risk of multiple copies being created, which in terms will endanger the validity and entirety of the database.

Finally, since this is a digital database, it has all the same faults as anything else on a computer, including corruption, duplication, and computer failure. To help preserve this file for future use, it is strongly suggested that a backup is kept at all times, which could be periodically synchronized with the latest version of the database.

7.3 Rehabilitation Laboratory

Although the physical condition of the lab has been improved, there are still revisions that can be made that will help to modernize the lab and increase the efficiency of its use throughout the year. The first suggestion is the addition of more signage such that visitors and passerby can identify the location of the ATRC and make better associations regarding what is done there. This sign should be of a size to fit above the doorway between HL126 and HL125 so as to be seen from the window at the top of the stairs, in front of the elevator. This space is currently vacant and there is ample room for a poster that may notify students of what the space is used for.

The lab might also be improved by designating wall space to display additional poster boards. If projects were more visible, the Center would be sharing even more information with the general public in a manner that does not require any upkeep or distribution. Poster boards are a simple method of marketing that is of little to no cost to the Center and they also instill a sense of pride in fellow students viewing the work.

For safety reasons, certain areas of the lab should be reserved as areas designated to cutting, soldering, or other processes which may be dangerous if disturbed or are prone to generate waste like sawdust. Designating areas for these functions of the lab will localize waste, making it easier to clean up and less likely for the waste to spread. Also, students are less likely to be injured if there is a specific place where more dangerous work is performed. Along the same lines, the area surrounding the eye-wash station should be cleared to at least a three foot radius so that there is ready access in the case of a real emergency. For this reason, among others, a tentative floor plan was devised for the space in the lab to be apportioned and assigned to separate work stations. The lab will have definite work areas for student groups to test, assemble, and manufacture projects as well as areas designated for the use of special tools that require extra safety precautions. The hope is that the floor plan will make it easier to keep track of tools, reduce clutter, and make the lab an overall safer, more organized area to work.

While clearing the countertops of the lab, it was clear that most of the clutter was the result of the project work of student groups. To deal with this, it may be helpful to assign a toolbox or a basket for each stations of the lab, solely for the use of students to keep the tools and materials they are using together, instead scattering them around the lab. Along the same lines, with the new labeling system it would be a minor task to assign a new group an empty cabinet and mark it theirs for as long as they might need it. Also, it may be of use to provide the lab with additional waste baskets and cleaning materials like brooms and dustpans, as well as places to store them.

Lastly, in an effort to reduce lost or misplaced special equipment, it may be advantageous to employ a sign in/sign out sheet in the lab. Although it may be difficult to enforce, if something came up missing, it would help give a better idea around what time the item disappeared and aid in locating the item. If the sheet were to include class year and major, along with what brings the student(s) to the lab (a course project, IQP, MQP, or EPICS, etc.), it could help the Center management identify who uses the lab the most and potentially cater to that individual or group. As the sheet would naturally include time for entrance and exit from the lab, management may also determine what times of day that the lab sees the most use and may schedule office hours accordingly.

7.4 Outreach

The ATRC is an active part of the community and already services a variety of individuals represented across New England. If the ATRC were interested in extending its outreach, one may recommend targeting involvement with local private and vocational schools. In reaching out to these students, WPI may find bright aspiring engineers in need of direction that can contribute greatly to the field of assistive technology. Conversely, the ATRC may also be of service for other high school students living with handicaps that require assistive technology devices. Although many times assistive technology for public school students is provided exclusively by the state, private or even charter schools may be interested in developing a program that can mutually beneficial to students with assistive technology needs and students with assistive technology interests. Much like the EPICS group, high school students may appreciate doing community service as engineering projects for those in need. *Appendix D: Potential Local Affiliates* was complied as a source of future contacts, which could potentially work with the ATRC due to similar interests.

Another way the ATRC might reach out further into the community would be by adding its contact information and a description of its services to online databases for

other assistive technology organizations in the area. This makes the ATRC searchable for people seeking specific technological needs, as opposed to arriving upon the ATRC after first looking at WPI. Doing so would aid in establishing the ATRC as a regional hub for technical service.

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Appendix A: RESNA Standards of Practice

(*Standards of Practice*)

RESNA STANDARDS OF PRACTICE for Assistive Technology Professionals
These Standards of Practice set forth fundamental concepts and rules considered essential to promote the highest ethical standards among individuals who evaluate, assess the need for, recommend, or provide assistive technology. In the discharge of their professional obligations the following principles and rules shall be observed:

1. Individuals shall keep paramount the welfare of those served professionally.

2. Individuals shall engage in only those services that are within the scope of their competence, their level of education, experience and training, and shall recognize the limitations imposed by the extent of their personal skills and knowledge in any professional area.

3. In making determinations as to what areas of practice are within their competency, assistive technology practitioners and suppliers shall observe all applicable licensure laws, consider the qualifications for certification or other credentials offered by recognized authorities in the primary professions which comprise the field of assistive technology, and abide by all relevant standards of practice and ethical principles, including RESNA's Code of Ethics.

4. Individuals shall not willfully misrepresent their credentials, competency, education, training and experience in both the field of assistive technology and the primary profession in which they are members. Individuals shall disclose their employer and the role they serve in the provision of assistive technology services and devices in all forms of communication, including advertising that refers to their certification in assistive technology.

5. Individuals shall inform consumers or their advocates of any employment affiliations, and financial or professional interests that may be perceived to bias recommendations. In some cases, individuals shall decline to provide services or supplies where the conflict of interest is such that it may fairly be concluded that such affiliation or interest is likely to impair professional judgments.

6. Individuals shall use available resources to meet the consumers' identified needs including referral to other professionals, practitioners or sources which may provide the needed product and/or service.

7. Individuals shall cooperate with members of other professions, where appropriate, in delivering services to consumers, and shall actively participate in the team process when the consumers' needs require such an approach.

8. Individuals shall offer an appropriate range of assistive technology services which may include assessment, evaluation, trial, simulation, recommendations, delivery, fitting, training, adjustments and/or modifications and promote full participation by the consumer in each phase of service.

9. Individuals shall verify consumer's needs by using direct assessment or evaluation procedures with the consumer.

10. Individuals shall inform the consumer about all device options and funding mechanisms available regardless of finances, in the development of recommendations for assistive technology strategies.

11. Individuals shall consider future and emerging needs when developing intervention strategies and fully inform the consumer of those needs.

12. Individuals shall provide technology that minimizes consumers' exposure to unreasonable risk. Individuals shall provide adjustments, instructions or necessary modifications that minimize risk.

13. Individuals shall fully inform consumers or their advocates about relevant aspects of the final recommendations for the provision of technology, including the financial implications, and shall not guarantee the results of any service or technology. Individuals may, however, make reasonable statements about the recommended intervention.

14. Individuals shall document, within the appropriate records, the technology evaluation, assessment, recommendations, services, or products provided and preserve confidentiality of those records, unless required by law, or unless the protection of the welfare of the person or the community requires otherwise.

15. Individuals shall endeavor, through ongoing professional development, including continuing education, to remain current on assistive technology relevant to their practice including accessibility, funding, legal or public issues, recommended practices and emerging technologies.

16. Individuals shall endeavor to institute procedures, on an on-going basis, to evaluate, promote and enhance the quality of service delivered to consumers.

17. Individuals shall be truthful and accurate in public statements concerning their role in the provision of all assistive technology products and services.

18. Individuals shall not discriminate in the provision of services or supplies on the basis of impairment, diagnosis, disability, race, national origin, religion, creed, gender, age, or sexual orientation.

19. Individuals shall not charge for services not rendered, nor misrepresent services delivered or products dispensed for reimbursement or any other purpose.

20. Individuals shall not engage in fraud, dishonesty or misrepresentation of any kind, or forms of conduct or criminal activity that adversely reflects on the field of assistive technology, or the individual's ability to serve consumers professionally.

21. Individuals whose professional services are adversely affected by substance abuse or other health-related conditions shall seek professional advice, and where appropriate, voluntarily withdraw from practice.

22. Individuals shall respect the rights, knowledge, and skills of colleagues and others, accurately representing views, information, ideas, and other tangible and intangible assets including copyright, patent, trademark, design contributions, and findings.

Appendix B: Rehabilitation Laboratory Floor Plans

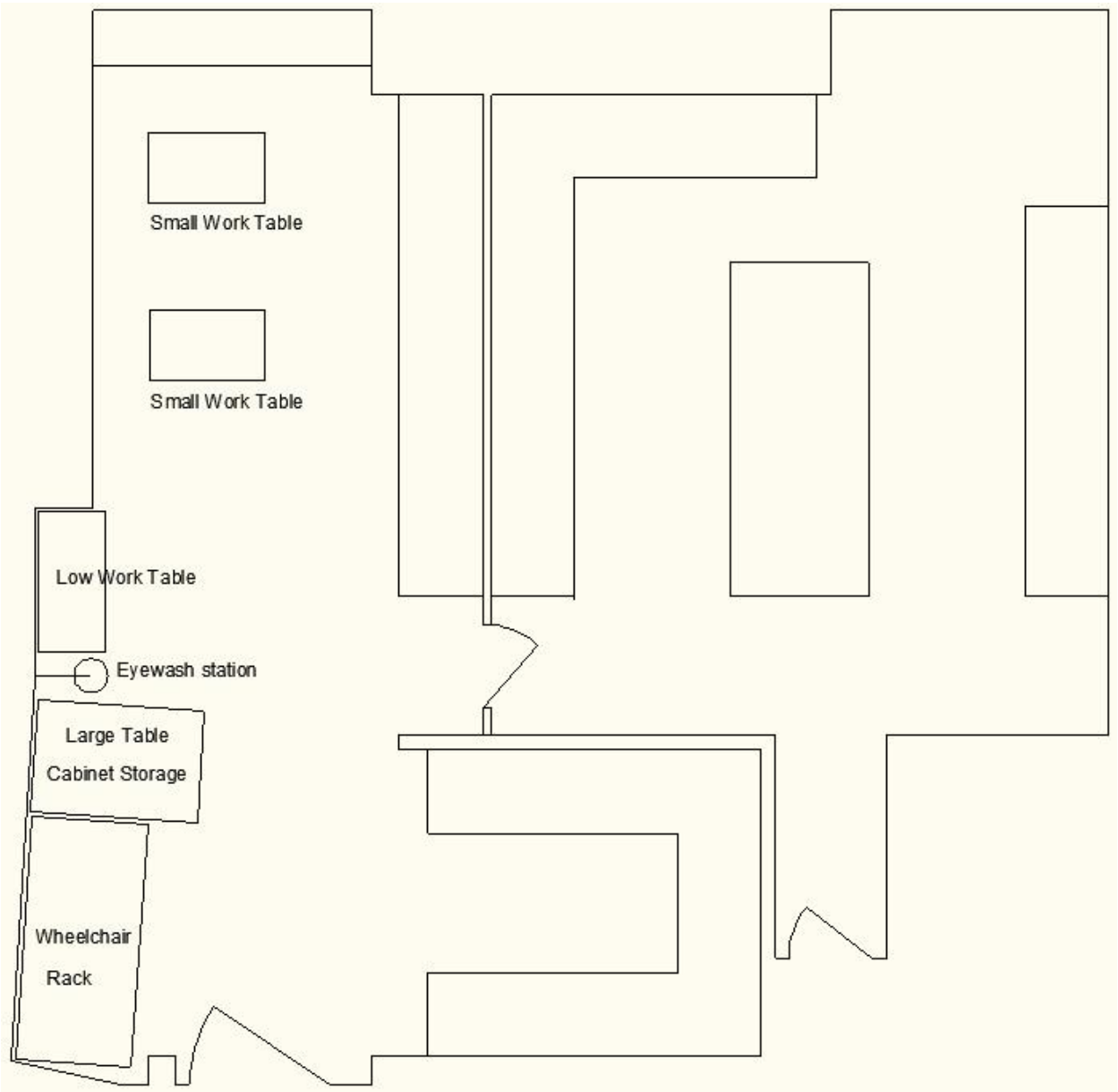


Figure A1 – Original Floor Plan

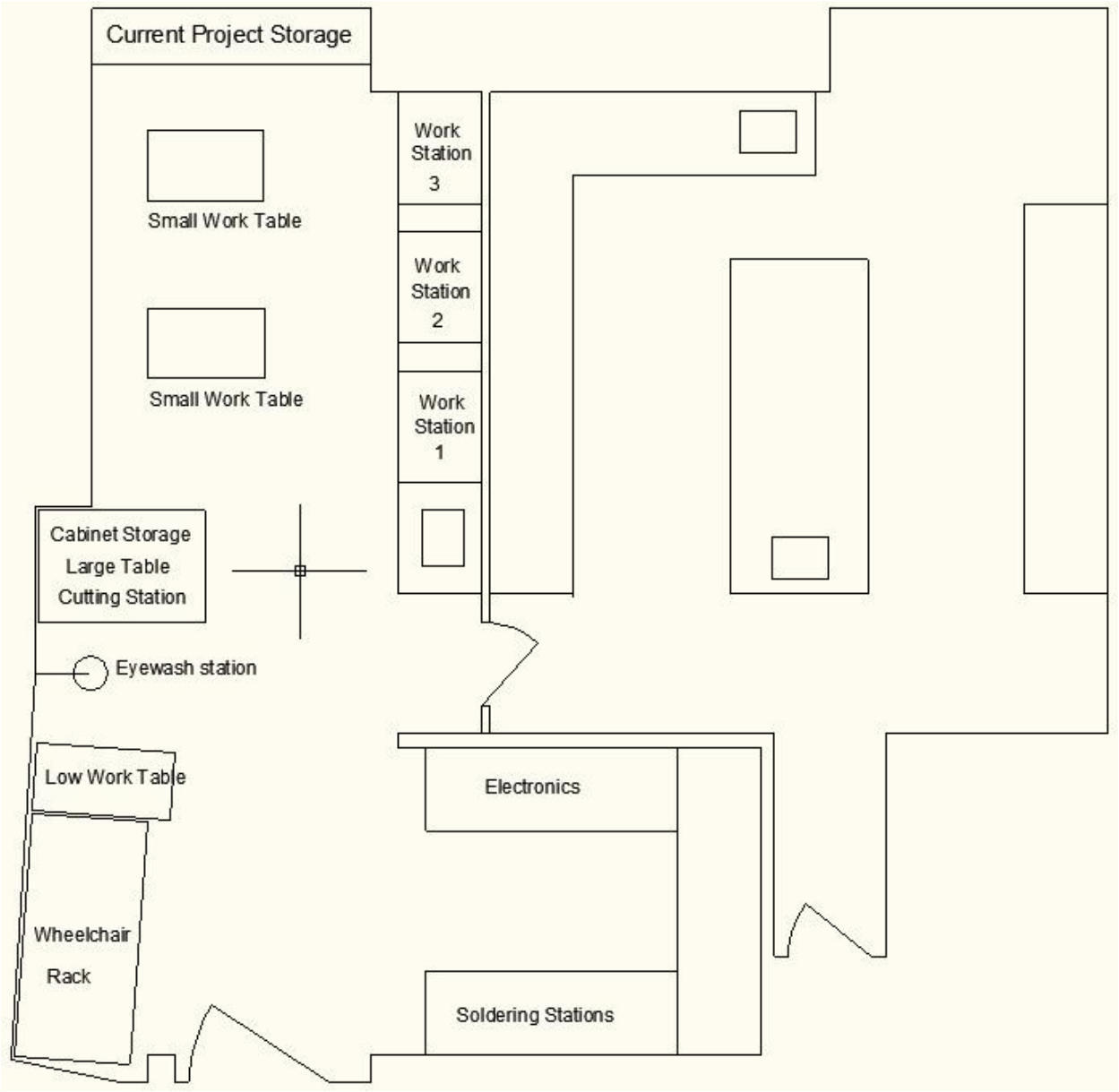
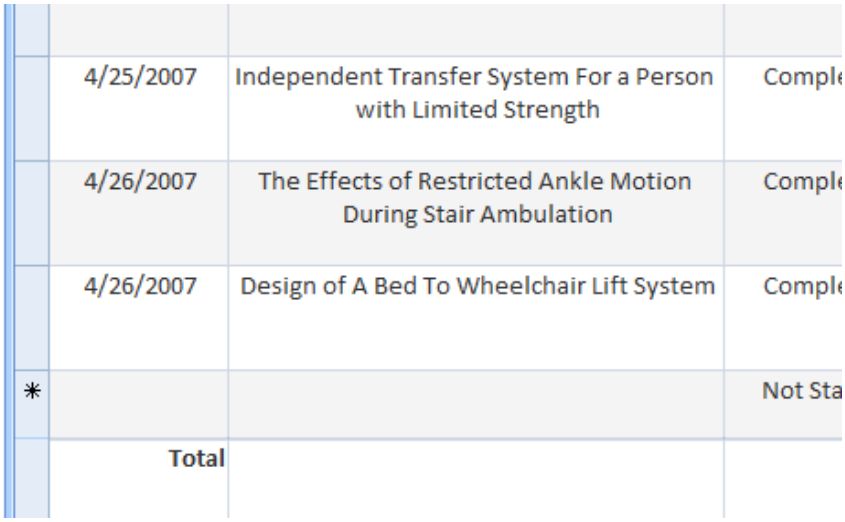


Figure A2 – Recommended Floor Plan

Appendix C: Database Instructions

Having a digital project and contact database seemed like a very important tool at the beginning of this project. For that reason, a great amount of time was spent compiling the necessary information and formatting the database in order to allow to easily access and sort the content. The database was later expanded to include project description fields, such as purpose and technology type, so that the database can be split into different categories, which could provide multiple benefits.

The database uses Microsoft Access for software. Individual fields were created and defined and the content was then added. This process can be continued very simply. In order to add more content, the user should scroll to the end of the database (bottom) and simply type the information in the row that has the star (as seen in *Figure A3*). This star signifies a new field.



	4/25/2007	Independent Transfer System For a Person with Limited Strength	Comple
	4/26/2007	The Effects of Restricted Ankle Motion During Stair Ambulation	Comple
	4/26/2007	Design of A Bed To Wheelchair Lift System	Comple
*			Not Sta
	Total		

Figure A3 - New Field Star Mark

Furthermore, if the user desires to add a new field, it can be done by renaming "*Add New Field*" column to the desired name. Once the whole field is selected, using the *Datasheet* tab, under *Data Type* the column can be changed between multiple data types such as text or date/time. This process can be seen in *Figures A4 and A5* below:

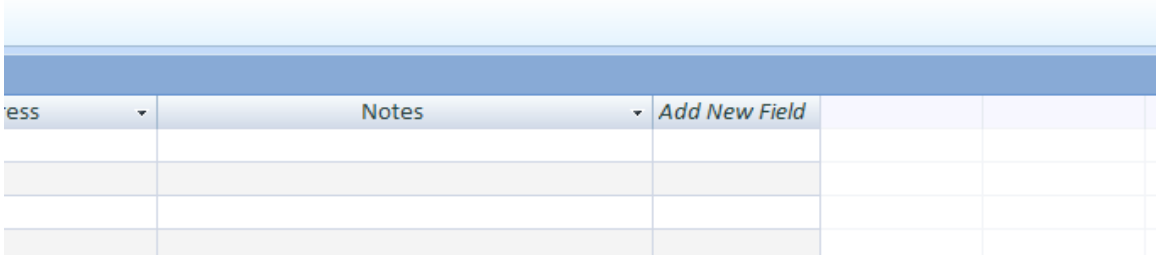


Figure A4 - "Add New Field" Column

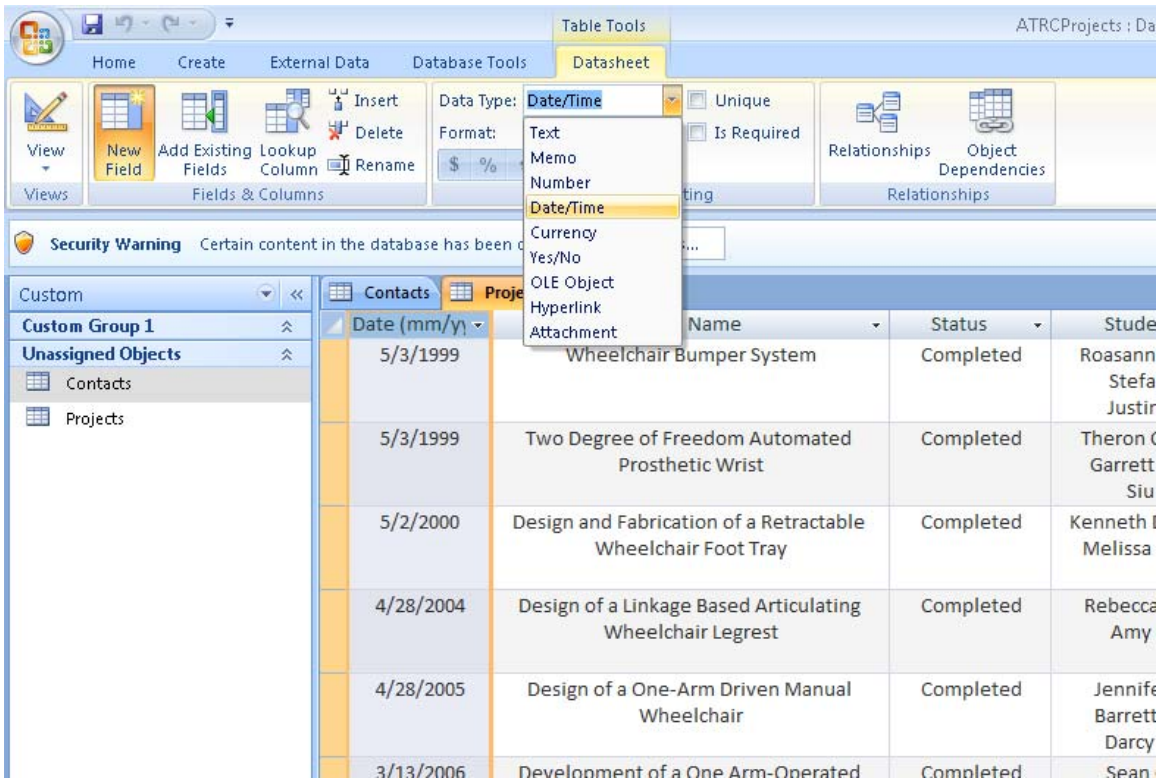


Figure A5 - Changing Data Type

Appendix D: Potential Local Affiliates

Adapted Activities Library A program of Department of Mental Retardation 200 Trapelo Road Waltham, MA (781) 894-3600 **Program Type(s):** Equipment	**Adaptive Design** A program of ESIS 3 Randolph Street Canton, MA (781) 830-8714 **Program Type(s):** Equipment
Adaptive Design Services/Clinical Resource Team 195 Industrial Drive Northampton, MA (413) 585-1153 Program Type(s): Equipment	**Architect** Greenfield, MA (413) 774-2248 **Program Type(s):** Equipment
Assistive School System Educational Technology Services, Inc A program of ASSETS, INC. 256 Union Street New Bedford, MA (508) 992-3128 **Program Type(s):** Community Technology Center, Consulting/Training, Diagnosis/Evaluation, Independent Living	**Assistive Technology Resource Center** A program of Wrentham Developmental Center - DMR Emerald Street Wrentham, MA (508) 384-3116 **Program Type(s):** Equipment, Information and Referral
Augmentative Communication Program A program of The Fernald Center 200 Trapelo Road Waltham, MA (781) 894-3600 **Program Type(s):** Equipment	**Ayers Handicap Conversion Center, Inc.** 440B East Squantum Street Quincy, MA (617) 328-0102 **Program Type(s):** Equipment
Crystal Springs School A program of Institute for Developmental Disabilities, Inc 38 Narrows Road Assonet, MA (508) 644-3101 **Program Type(s):** Education 3-22	**Department of Biomedical Engineering** A program of Brigham and Women's Hospital 75 Francis Street Boston, MA (617) 732-8889 **Program Type(s):** Equipment
Department of Physical/Occupational Therapy A program of Children's Hospital FA123 300 Longwood Avenue Boston, MA (617) 355-7212 **Program Type(s):** Equipment	**Design-Able, Inc.** 323 Manley Street West Bridgewater, MA (508) 436-7414 [x104] **Program Type(s):** Equipment

Disability Services A program of Greenfield Community College One College Drive Greenfield, MA (413) 775-1812 **Program Type(s):** Post-Secondary Education	**Donald L' Homme / Home Accessible Modification** A program of Marani Construction Corp. 4 Shaker Ave Wareham, MA (508) 272-1786 **Program Type(s):** Equipment, Home Modification
Equipment Program A program of Better Hearing Solutions 24 Park Avenue Worcester, MA (508) 753-8155 **Program Type(s):** Equipment	**Equipment Program** A program of Assabet Valley Collaborative 215 Fitchburg Street Marlborough, MA (508) 485-9430 **Program Type(s):** Equipment
Equipment Programs A program of KarTech, Associated Hyannis, MA (508) 771-3585 **Program Type(s):** Consulting/Training, Equipment, Social/Leisure, Support Groups-Networks, Vocational	**Family Center** A program of Clarke School for the Deaf Round Hill Road Northampton, MA (413) 584-3450 **Program Type(s):** Education 3-22
Foley Medical Supply 28 White's Path South Yarmouth, MA (508) 394-1375 **Program Type(s):** Equipment	**Hawthorn Medical Associates** 535 Faunce Corner Road North Dartmouth, MA (508) 996-3991 **Program Type(s):** Equipment
Hearing Center A program of Mercy Medical Center 231 Carew ST Springfield, MA (413) 748-6840 **Program Type(s):** Aging, Communication, Consulting/Training, Diagnosis/Evaluation, Equipment	**Home Accessible Modification / Ramps and Lifts** A program of Manchester Home Improvement 209 Rogers Avenue West Springfield, MA (413) 733-4689 **Program Type(s):** Aging, Home Modification, Independent Living, Institutions
Home Accessible Modifications A program of Bill Croston Building Construction 55 Suomi Rd Hyannis, Ma 02601 Osterville, MA (800) 924-1073 **Program Type(s):** Equipment, Home Modification	**Housing Devices, Inc.** 407 R. Mystic Ave. Medford, MA (781) 395-5200 **Program Type(s):** Equipment
Inpatient/Outpatient Rehab Services A program of HealthSouth Rehabilitation Center 14 Chestnut Place Ludlow, MA (413) 589-7581 **Program Type(s):** Equipment, Inpatient Medical, Outpatient Medical/Allied Health	**Joseph P. Mattei & Associates, AIA** A program of The Shelburne Architects 25 Guy Manners Road Shelburne, MA (413) 625-2584 **Program Type(s):** Equipment

Kelley Assistive Technology Resource Center A program of Hogan Regional Center DMR Northeast Region 450 Maple Street Hathorne, MA (978) 774-5000 **Program Type(s):** Equipment	**Liberating Technologies, Inc.** 325 Hopping Brook Rd Holliston, MA (508) 893-6363 **Program Type(s):** Equipment
Lincoln Auto School 10 Cross Street Whitinsville, MA (508) 473-9344 **Program Type(s):** Equipment	**Low Vision Rehabilitation Service** A program of New England Medical Center 750 Washington Street Boston, MA **Program Type(s):** Equipment
Medequip, Inc. 134 Bliss Street West Springfield, MA (413) 737-5466 **Program Type(s):** Equipment	**Motion Automotive Specialty** Route 20 Brimfield, MA (413) 245-9949 **Program Type(s):** Equipment
Natick Area Office A program of Massachusetts Rehabilitation Commission 251 West Central Street Natick, MA (508) 651-7531 **Program Type(s):** Vocational	**New England Wheels, Inc.** 33 Manning Rd Billerica, MA (800) 886-9247 **Program Type(s):** Equipment, Transportation
Nicholas Warren Ergonomic Services 50 Forbes Avenue Northampton, MA (413) 585-5909 **Program Type(s):** Equipment	**Occupational Rehabilitation Group, Inc.** Cambridge, MA (617) 661-5667 **Program Type(s):** Consulting/Training, Equipment, Vocational
Operation Independence, LLC. 325 School Street Watertown, MA (617) 923-4545 **Program Type(s):** Equipment, Home Modification	**Quality Van Sales** 349 Old Colony Rd, Rte 123 Norton, MA (800) 408-8550 **Program Type(s):** Equipment
SafetyCare A program of Natale Company 9 Third Road Woburn, MA (781) 933-7205 **Program Type(s):** Equipment	**SHARE Foundation, Inc.** A program of University of Massachusetts / Dartmouth 285 Old Westport Road North Dartmouth, MA (508) 999-8482 **Program Type(s):** Equipment

Shore Educational Collaborative A program of Shore Educational Collaborative - Owen School 100 Revere Beach Parkway Chelsea, MA (617) 887-2930 **Program Type(s):** Education 3-22	**Solutions for Accessibility** 119 Poplar St Watertown, MA (877) 923-8877 **Program Type(s):** Consulting/Training, Equipment, Housing
Special Clothes / Special Children Harwich, MA (508) 430-2410 **Program Type(s):** Equipment	**Therapeutic Equipment Center** A program of The Fernald Center 200 Trapelo Road Waltham, MA (781) 894-3600 **Program Type(s):** Consulting/Training, Day/Work Activity, Equipment, Institutions, Transportation, Vocational
Vocational Rehabilitation A program of Massachusetts Commission for the Blind - Region II 390 Main Street Worcester, MA (508) 754-1148 **Program Type(s):** Communication, Day Care, Diagnosis/Evaluation, Early Intervention, financial Assistance/Planning, Information/Referral, Inpatient Medical, Legal/Advocacy, Mental Health, Respite, Support Groups-Networks, Transitional/Supported Employment, Transportation, Vocational	**Weldon Center for Rehabilitation** A program of Mercy Hospital 233 Carew St Springfield, MA (413) 748-6800 **Program Type(s):** Equipment, Inpatient Medical, Outpatient Medical/Allied Health
William Starck Architects, Inc. 114 Durfee Street Fall River, MA (508) 679-5733 **Program Type(s):** Consulting/Training	-

Table A1 – Potential Local Affiliates